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Evaluation of a training programme aimed at increasing teachers' awareness of common childhood problems

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1 CET point for UK optometrists

Abstract

Evidence suggests that children with both refractive and permanent visual impairment are at a disadvantage compared to their visually normal peers with regard to educational achievement. Teachers receive limited training in paediatric health disorders, particularly relating to the eyes and visual system. This study evaluated a training programme aimed at increasing teachers' knowledge and awareness of childhood vision problems. Two groups of teachers (primary and post-primary) (in-training: $n = 42$ and qualified: $n = 9$) attended a lecture and workshop outlining common visual problems in children. The workshop simulated a range of visual difficulties, allowing teachers to gain an insight into how visual impairment may impact on learning. The design of the programme was informed by educational specialists with experience in designing pedagogic programmes for postgraduate trainee teachers. This interprofessional approach prompted the inclusion of teaching methods, typically used with teacher education programmes. Formal feedback was invited following the lecture and workshop using a questionnaire employing both open and closed questions. Questions related to each individual's level of knowledge of 'common causes of visual impairment', 'professionals involved in eye care' and 'how to address visual problems in the classroom' before and after participating in the session. Closed questions were graded using a five-point Likert grading scale. Seventeen questionnaires were returned from the teachers in training and eight from qualified teachers. Non-parametric analyses were applied. In both groups, a significant improvement in knowledge was obtained for all three areas ($p < 0.05$). Open comments were positive and related to gaining an insight into the learning experiences for children with visual problems and how to overcome potential barriers as a result of visual impairment.

This novel interprofessional initiative highlights teachers' lack of knowledge of common childhood vision problems and how to address these within a mainstream classroom environment. The study also demonstrated the potential of a novel training programme to improve teachers' awareness of how visual problems impact on classroom behaviour and learning, and how to address these problems to the benefit of their pupils. It demonstrated the importance of viewing patients holistically, considering the effects of healthcare and education synergistically. Further work is required to investigate fully the long-term implications of such training.

Introduction

It is well established that children with a significant visual impairment are also at risk from developmental setback in terms of sensorimotor understanding, verbal comprehension, social development and behavioural status (Cass et al. 1994). In addition, there is strong evidence to suggest that children with a visual impairment are at a significant disadvantage compared to their visually normal peers with regard to educational achievement (Cass et al. 1994; Doyle et al. 2016; Stewart-Brown et al. 1985), with research demonstrating that refractive error is associated with reduced academic performance and reading ability (Doyle et al. 2016; Dusek et al. 2010; Orlansky et al. 2015; Rosner and Rosner 1997). More specifically, hyperopia has been linked with underachievement in standardised educational assessments in children (Williams et al. 2005), with hyperopic children underperforming in standardised tests compared to their

myopic peers (Au Eong et al. 1993; Dirani et al. 2008; Rahi et al. 2011; Wensor et al. 1999). However, myopic children's academic performance is also reported to be significantly poorer when spectacle correction is not worn (Doyle et al. 2016; Ma et al. 2014).

In addition to refractive error posing a risk to educational attainment, research has demonstrated that socioeconomic status (SES) has a significant impact on academic performance, with a UK government review reporting that white children who were eligible for free school meals (an indicator of lower SES) were found to be the lowest-performing children at age 16 (Ofsted 2013). This is further compounded by a significant relationship between refractive error and SES (Doyle et al. 2016), with Doyle et al. (2016) demonstrating a significant relationship between poor performance in GCSE English examinations and hyperopia even when SES was controlled for.

In a drive towards inclusive education, there has been a trend in recent years for children with a recognised visual impairment to attend mainstream schools with input from specialised support teachers (qualified teachers for the visually impaired) rather than attend special educational environments (McClelland et al. 2007). In addition, during the previous two decades, there has been an increasing prevalence of myopia in childhood across many developed countries worldwide (Holden et al. 2016; Williams et al. 2015), with the proportion of myopic children in the UK more than doubling in the past 50 years (McCullough et al. 2016).

In a study of school-aged children in Northern Ireland, O'Donoghue et al. (2010) found that, whilst the prevalence of presenting visual impairment was low, almost one in four children fail to bring their spectacles to school. Presenting visual impairment, as defined by the World Health Organization, includes measures of vision from those individuals who may have a visual impairment that could be improved by providing an appropriate refractive correction (Gilbert and Ellwein 2008). It characterises the visual impairment faced by individuals on a day-to-day basis without spectacle correction in place (Resnikoff et al. 2008).

Due to the constantly evolving and expanding prescribed curriculum, teachers, including special educational needs coordinators, receive limited training in paediatric health disorders, particularly relating to the eyes and the visual system (Dewhirst et al. 2014; Gibb 2015). These factors highlight the importance of education professionals' awareness of the influence of visual problems on children's learning. However, often poor communication between eye care and education professionals can prevent important information relating to children's vision being considered in the educational statementing process (Little and Saunders 2015). This can further compound the effects of the visual problems on the child's education.

In general, children with a recognised visual impairment will have educational input from qualified teachers for the visually impaired, educational professionals specifically trained to work with children with a visual loss. In addition, children attending special education schools are more likely to have regular on-site healthcare evaluations. This training programme is specifically aimed at teachers in mainstream schools who encounter children who are experiencing common vision problems (ametropia, colour vision

Table 1. Outline of topics discussed during lecture

Who are the different eye care professionals and what do they do? eg optometrist, orthoptist, ophthalmologist
Refractive error What does it mean to be long- or short-sighted or have astigmatism? How common are these conditions?
Focusing What is ocular accommodation and how does it affect vision if it is impaired?
Binocular vision What is a strabismus (turn in the eye) and how does this affect vision? What is amblyopia (lazy eye) and how can this be prevented?
Colour vision How common are anomalies of colour vision and how do they impact on learning in the classroom?
Vision screening How does this work in Northern Ireland? Which problems are easily detected and which are likely to be missed?
Eye examinations for children What is involved? When should children have their eyes tested? How is this financed?
Visual impairment What happens when a child has a significant visual impairment? How is this information provided to schools? What can teachers do to help?
Cortical visual impairment What is this and how does it impact on vision in the classroom? What strategies can teachers use to address these problems?
Vision and education Why is vision so important to education? What is the evidence for this?

anomalies, etc.). This study aims to investigate teachers' level of knowledge of common vision problems in children and evaluate a novel interprofessional approach providing qualified teachers and those in training with an overview of common visual problems that children may experience, and advice on how to identify and address these difficulties in the classroom environment.

Methods

Combining clinical and research expertise in the assessment of children's vision, particularly in children with special educational needs (JMcC and LD), with teaching education academic knowledge (JL), a novel programme was developed to raise awareness amongst teachers (trainee and qualified) of common visual problems in children. The programme included information on how these conditions may impact on classroom behaviours, how they may be identified and strategies to address them.

The educational professionals were able to input into the programme design by outlining the level of knowledge of qualified and in-training teachers with regard to visual impairment. They contributed to the programme development, suggesting pedagogic methods that are typically used in teacher training, including reflective practice, peer learning and the concept of 'known knowns' and 'unknowns' (Gavriel and Garvriel 2011).

The programme comprised two parts: a 1-hour lecture (Table 1) and a 2-hour workshop based within the Ulster University Optometry Clinic (Table 2). The Optometry Clinic is a fully equipped teaching environment used for demonstration and practice of clinical skills with undergraduate optometry students. The workshop was designed to simulate a range of different visual problems, allowing teachers to gain an insight into how visual impairment may impact on learning.

Phase 1

A group of trainee teachers undertaking a Postgraduate Certificate in Education (PGCE) towards a qualification in primary school teaching ($n = 25$) were invited to participate in a session, incorporating a lecture and workshop, in December 2015. These participants were completing a 1-year postgraduate programme following an initial undergraduate degree in a wide range of subject areas. Feedback was obtained informally from this session to inform future developments in the programme. Following the lecture and workshop the students were asked to report on any changes they felt should be incorporated into future sessions. Comments received were mainly positive; however, one suggestion that came from a number of students was that they would have liked more information on how teachers can address visual problems in the classroom. This comment was discussed and an updated version of the lecture and workshop was produced. It was decided that a more formal method of collecting feedback should be used in future events.

Phase 2

A group of post-primary PGCE students ($n = 17$) were invited to attend a session in February 2016. Following the lecture and workshop, formal feedback was collected to assess teachers' level of knowledge before and after participating in the session questionnaire with both open and closed questions (Appendix 1). Questions related to each individual's level of knowledge of 'common causes of visual impairment', 'professionals involved in eye care' and 'how to address visual problems in the classroom' before and after participating in the session. The closed questions employed a five-point Likert scale to grade responses (1 = strongly agree; 2 = agree; 3 = neither agree nor disagree; 4 = disagree; 5 = strongly disagree). Questionnaires were intended to be anonymous; however, one participant included their name and position in a school.

Table 2. Outline of workshop topics

Workshop station	Topic
1	Refractive error (simulation of different amounts of long or short sight and astigmatism)
2	Contrast sensitivity (simulation of poor contrast acuity and how this may impact on learning)
3	Colour vision (demonstration of different types of colour vision anomalies using practical examples)
4	Binocular vision (demonstration of how stereopsis (three-dimensional vision) may be affected when eyes don't work well together due to a strabismus or lazy eye)
5	Cortical visual impairment (examples of how someone with cortical visual impairment may have visual processing difficulties)
6	Accommodation (simulation of how poor accommodation or focusing might impact the ability to see fine detailed tasks at close distances)
7	Simulation glasses (to portray a range of disorders resulting in a variety of visual field defects and examples of strategies to minimise the impact of these defects in the classroom)
8	Visual impairment quiz and discussion (which signs and symptoms in the photographs may lead to a serious visual problem?)

Phase 3

Funding was obtained from the Centre for Flexible and Continuing Education to invite qualified and experienced teachers in the community to attend a lecture and workshop session in June 2016. Due to the association between refractive error, SES and academic achievement, it was deemed appropriate to open the invitation to teachers from local schools identified as having low deprivation scores. The funding source facilitated nine teachers to attend, with the School of Education also providing reimbursement for a substitute teacher for those attending the short course. The same questionnaire was used to assess engagement with the programme.

Ethical approval

Before commencement of the study, the Chair of the Biomedical Sciences Ethics Filter Committee confirmed that this study was classified as a teaching evaluation and therefore formal ethical approval was not required. All data were collected anonymously and informed consent was obtained prior to collecting questionnaire data.

Results

In total 51 teachers (in training and qualified) attended the training programme.

Data were entered into an SPSS spreadsheet (IBM SPSS Statistics Version 22). Mean scores were calculated for each question and descriptive statistics were used to summarise data. Due to the small participant numbers involved, non-parametric analyses were applied (Mann–Whitney U).

Power calculations were not used to inform the sample size as this research was designed as a study to inform teaching provision.

Phase 2 results

The anonymised questionnaire asked the trainee teachers their opinion on their level of knowledge of 'visual impairment', 'different professionals involved in eye care' and 'how to address visual problems in the classroom' before and after the session. Responses from each question were assigned a score from 1 to 5 (where 1 = strongly agreed and 5 = strongly disagreed). Seventeen questionnaires were returned and scores from each question were entered into SPSS and results analysed. Due to the small number of respondents, non-parametric analyses were applied (Mann–Whitney U). A significant improvement in the scores was obtained for all three questions ($p < 0.05$). A lower score indicated stronger agreement with the statement (Figure 1).

Open comments were also invited on the aspects of the lecture and workshops that they found most and least useful. All comments were positive and related to gaining an insight into the learning experiences for children with visual problems. Examples of comments included the following.

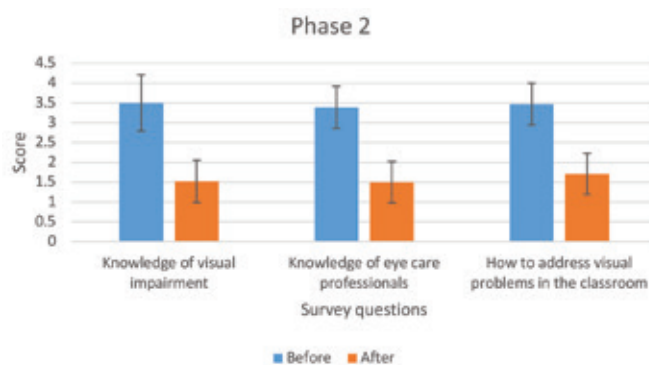


Figure 1. Phase 2 survey scores relating to the three areas of questioning before and after the training: 'knowledge of visual impairment', 'knowledge of eye care professionals' and 'how to address visual problems in the classroom'.

Aspects of the lecture/workshops I found most useful

'The tips on how to make lessons more accessible'.

'...how to remove the barriers to learning'.

'We can now empathise with students knowing what it is like to have a visual impairment.'

'How to adapt resources in the classroom was interesting.'

Phase 3 results

Eight anonymised questionnaires were returned and again a significant improvement in the scores was obtained for all three questions ($p < 0.05$). A lower score indicated stronger agreement with the statement (Figure 2).

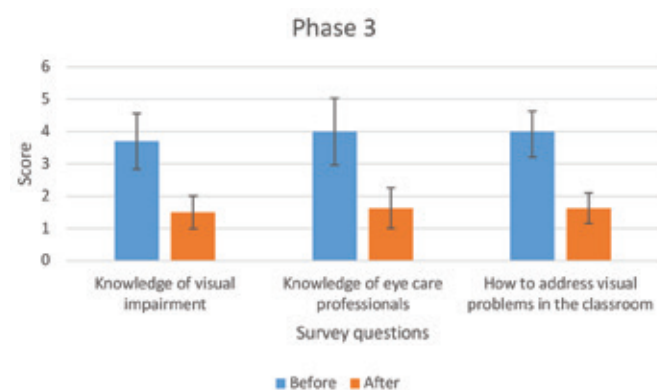


Figure 2. Phase 3 survey scores relating to the three areas of questioning before and after the training: 'knowledge of visual impairment', 'knowledge of eye care professionals' and 'how to address visual problems in the classroom'.

Similar to the phase 2 open comments, the qualified teachers responded positively to the lecture and workshop. Examples of comments included the following.

Aspects of the lecture/workshops I found most useful

'Very interesting trying on the glasses. Really gave us a good understanding of what the different types of visual impairment might be like.'

'Practical and very helpful...'

'I will be more aware of how these eye problems affect children's learning in the classroom.'

'The various activities in the workshops were particularly beneficial.'

'Being actually able to "see" the vision problems was fantastic.'

'I will reconsider layout of classroom.'

'This should be available again to more teachers.'

Discussion

This novel initiative intended to assess teachers' knowledge of childhood vision problems and evaluate a bespoke training programme designed by clinical and research optometrists to increase teachers' awareness of visual problems that children may experience and discuss how these may impact on classroom behaviours. The study demonstrated a significant gap in teachers' knowledge and lack of training specific to the vision system and common vision problems likely to be encountered in the classroom environment. The evaluation provided positive feedback from trainee and qualified teachers, suggesting that this approach offers a fresh insight and different perspective to the standard classroom-based education for teachers.

The use of the Optometry Clinic space provided the teachers with an area where they could appreciate the impact a change in vision may have on school pupils, for example by simulating blurred vision on a letter chart. During the sessions, the qualified teachers were able to discuss individual schoolchildren they had taught and the difficulties they had faced in ensuring equal access to learning material.

The discussion that ensued allowed the optometrists (JMcC and LD) to provide further suggestions for particular situations. A significant improvement in questionnaire scores suggests that the teachers perceived that the training programme provided them with knowledge and tools to identify common vision problems and modify the classroom environment in an appropriate manner to meet the visual needs of pupils.

The funding source for phase 3 was aimed at widening access to education and increasing participation of schoolchildren attending schools in areas of deprivation in light of the association between SES, refractive error and academic performance. It is essential that, to optimise the learning environment for children, visual disorders are detected and remedied as early as possible to prevent permanent negative effects on academic and developmental attainment (Roch-Leveq et al. 2008; Williams et al. 2005).

The use of an interprofessional approach to teaching and learning reminded both groups of professionals that they are not working in isolation, but as part of a multidisciplinary team working with parents and healthcare professionals

to provide the most appropriate learning environment for each individual child. Teachers are well placed to ensure that any visual outcomes and/or recommendations from eye care professionals are actioned in the classroom and that strategies to maximise the visual environment by optimising accessibility to educational material are employed.

Evidence suggests that, even in cases of a significant recognised visual impairment, information on the eyes and visual system may not reach the child's individual educational plan (or statement of educational need (Northern Ireland)) (Little and Saunders 2015). By increasing teachers' awareness of potential visual problems they may feel more comfortable enquiring about vision-related issues with parents. Increasing awareness of visual issues may also prompt teachers to consider the importance of how any suggestions/recommendations made by eye care professionals are maintained in the child's record and followed through. In addition, the optometrists involved in the workshops have gained valuable experience in working with education professionals, gaining further insight into teachers' perception of eye care and its importance in the learning environment.

The lecture also provided teachers with a link to the widely used Ulster Vision Resources (<https://www.ulster.ac.uk/research/institutes/biomedical-sciences/research/optometry-and-vision-science-research-group/vision-resources/resources-for-parents>), which provides useful information on children's visual problems for parents and professionals. These web pages are open-access and provide a wealth of information, including sections such as 'Encouraging your child to wear spectacles' and 'Considerations for the classroom'.

The potential benefits of this programme for children's learning are significant. Further investigation of similar training programmes may provide an insight into the longitudinal benefits. The authors suggest that similar training should be incorporated in the undergraduate programme for trainee teachers and that qualified teachers would also benefit from a regular refresher course in this area to maintain knowledge and engagement with these issues.

Interprofessional education plays a significant role in a wide range of healthcare training programmes; however, there is limited published evidence outlining collaborations between eye care and education. Established programmes such as the Moorfields Eye Hospital initiative Eye Heroes demonstrate excellent interprofessional collaborations between eye care and education, promoting children as the 'champions' of eye health (eyeheroes.org.uk). Interprofessional learning experiences encourage collaborative working and sharing of essential skills and knowledge, benefiting the professionals and ultimately service users themselves.

Conclusion

This study has highlighted a gap in teachers' knowledge of how to identify common vision problems in children and how to address these in a mainstream classroom environment. The study demonstrates an improvement in teachers' knowledge following a novel interprofessionally designed

training programme which has the potential to maximise the learning environment of children and remove any vision-related barriers.

● Summary

An interprofessional learning initiative combined the knowledge and skills of clinical and research optometrists and education academics to develop a training programme for teachers. This course, aimed at teachers in mainstream education, provided information on how common visual problems may impact classroom behaviours and how to address them to optimise the learning environment. The programme provided knowledge in three key areas (visual impairment, different professionals involved in eye care and addressing visual problems in the classroom). Outcomes demonstrated that this novel, cross-disciplinary initiative, which provided a practical and immersive approach, successfully increased teachers' awareness of visual problems amongst schoolchildren.

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Appendix 1.

Visual impairments lecture and workshops

Aspects of the lecture and workshop I found most useful:

Aspects of the lecture and workshop I found least useful:

Please choose most appropriate answer.

Q1 Before the lecture and workshop I had a good understanding of visual impairment

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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Q2 Before the lecture and workshop I had a good understanding of the different professionals involved in eye care

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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Q3 Before the lecture and workshop I had a good understanding of how to address children's visual problems in the classroom

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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Q4 After the lecture and workshop I have a better understanding of visual problems

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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Q5 After the lecture and workshop I have a better understanding of the different professionals involved in eye care

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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Q6 After the lecture and workshop I have a better understanding of how to address children's visual problems in the classroom

Strongly agree	Agree	Neither	Disagree	Strongly disagree
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CET multiple choice questions

This article has been approved for one non-interactive point under the GOC's Enhanced CET Scheme. The reference and relevant competencies are stated at the head of the article. To gain your point visit the College's website www.college-optometrists.org/oip and complete the multiple choice questions online. The deadline for completion is 31 July 2019. Please note that the answers that you will find online are not presented in the same order as in the questions below, to comply with GOC requirements.

1. Children with a significant visual impairment are also at risk from which of the following?
 - Reduced educational achievement
 - Developmental setbacks in verbal comprehension
 - Reduced development
 - All of the above
2. Hyperopia has been linked with which one of the following?
 - Underachievement in standardised educational assessments
 - Faster reading speed
 - Greater educational achievement compared to myopes
 - Slower reading speed than myopes
3. Which of the following is correct?
 - The study has highlighted a gap in teachers' knowledge of how to identify common vision problems in children
 - The study demonstrates an improvement in teachers' knowledge of common visual problems
 - The study has the potential to reduce vision-related barriers in the mainstream classroom
 - All of the above
4. Phase 2 of the study utilised which one of the following methods?
 - Questionnaire
 - Observations
 - Interviews
 - Assessment
5. How many teachers attended the training programme?
 - 8
 - 22
 - 25
 - 51
6. In what environment did the training take place?
 - Classroom
 - Lecture theatre
 - Optometry clinic
 - Virtually by webinar

● CPD exercise

After reading this article, can you identify areas in which your knowledge of this training programme aimed at increasing teachers' awareness of common childhood vision problems has been enhanced?

How do you feel you can use this knowledge to offer better patient advice?

Are there any areas you still feel you need to study and how might you do this?

Which areas outlined in this article would you benefit from reading in more depth, and why?